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THE SCOLYTID BEETLES OF THE GENUS *RENOCIS*
CASEY, WITH DESCRIPTIONS OF NINE NEW SPECIES

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FOR more than 45 years specimens of undescribed species of *Renocis* Casey have been accumulating in the National Museum owing to the efforts of various collectors.¹ Most of these specimens were collected in the Southwestern States. The species occurring in these arid and semi-arid regions are found in a variety of hosts. Species of the family Rosaceae (*Malus*, *Amelanchier*, *Cercocarpus*, *Cowania*, and *Prunus*) most frequently serve as hosts, but at least three Leguminosae (*Eysenhardtia*, *Prosopis*, and *Parkinsonia*) and in addition species of *Rhus*, *Ribes*, and *Covillea*, and of the genus *Encelia* of the Compositae, are also attacked by one or several species of *Renocis*.

It is doubtful whether any of the species ever breed successfully in the vigorous tissues of their hosts; but as the plants upon which they depend are common in grazing lands, a plentiful supply of injured and broken shrubs or limbs is always available in such areas.

¹ Included among these are E. A. Schwarz, H. G. Hubbard, H. S. Barber, D. W. Coquillett, H. F. Wickham, and A. D. Hopkins, formerly chief of the division of forest insect investigations, U. S. Bureau of Entomology, and his field force, including J. M. Miller, F. P. Keen, H. E. Patterson, W. F. Fiske, J. L. Webb, George Hofer, M. Crissman, and B. T. Harvey. Other specimens have been more recently received from the Southwest through J. N. Knull, T. O. Thatcher, and William Nye, and from Brazil through D. da Rocha. Also several series of a Mexican species have been intercepted by the New York, N. Y., Brownsville, Tex., and Nogales, Ariz., plant quarantine stations of this bureau.

In these semiarid regions, also, many of the host plants are weakened by drought, thus becoming suitable hosts for *Renocis*. Scorching of the host by light ground fires also furnishes suitable breeding material. On the other hand, the beetles' breeding activities in broken limbs and shrubs and in shrubs and small trees weakened by other causes may greatly increase the fire hazard.

While the hosts affected by species of *Renocis* are not usually producers of valuable wood, they are of great use as browse for both wild and domestic herbivora and are valuable in binding the soil on watersheds. Their destruction by fire and insects may result in serious erosion of the watershed, silting of the storage basins, or even disastrous landslides. Several species of *Renocis* are also known to attack fruit trees and shrubs, but they are not known to be really destructive in well-kept orchards.

Drawings for the figures herein were made under the author's supervision by Mrs. Eleanor A. Carlin, of the United States Bureau of Entomology and Plant Quarantine.

Genus *RENOCIS* Casey

Renocis CASEY, California Acad. Sci. Bull. 6, pp. 257-259, 1886.—SWAINE, New York State Mus. Bull. 134, p. 144, 1909; Canada Dept. Agr. Ent. Branch, Bull. 14, pt. 2, p. 39, 1918.—BRUCK, Bull. Southern California Acad. Sci., vol. 35, pt. 1, p. 41; pt. 2, pp. 119-120, 1936. (Genotype, *Renocis heterodoxus* Casey.)

Pseudocryphalus SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 1, p. 20, 1917; pt. 2, pp. 40, 57, 1918.—BRUCK, Bull. Southern California Acad. Sci., vol. 35, pt. 1, p. 35; pt. 2, pp. 121-123, 1936. (Genotype, *Pseudocryphalus brittanni* Swaine.)

Description.—Body stout, usually less than twice as long as wide. Head deflexed, slightly visible from above; frons concave in male at least, with longer, coarser setae at sides and above; antennal funicle 5-jointed, club compressed, often elongate, with three annulate-setigerous sutures; eyes elongate, sinuate or feebly emarginate in front. Pronotum deflexed, feebly arched, much wider than long, strongly narrowed in front, anterior margin usually unarmed, but with a fringe of erect setae, not sharply margined at sides, clothed in recumbent scales, with two or three small groups of asperities on disk at each side; scutellum lacking. Elytra with base strongly elevated and with coarse crenulations; punctate striate; interspaces clothed with recumbent scales, with a median row of erect setae on each; declivity unmodified, impressed or sulcate. First and second abdominal sternites subequal, each as long as third and fourth united; prosternum short but always present, partly or wholly concealed by the bulbous forecoxae; marginal teeth on foretibia varying with species from long and slender to short and stout.

Remarks.—Casey's description of the genus *Renocis* and the species *heterodoxus* was based upon a single specimen, and this not in perfect condition. This precluded the making of dissections and special mounts of parts that are essential in the proper study of such small insects. For this reason Casey's original description of *Renocis* may be modified and amplified in several respects.

On page 257 Casey says, "Anterior coxae in contact with the head beneath; prosternum entirely obsolete before them." Dissection demonstrates that the prosternum is always present (fig. 17, *a*) though rather narrow, and although it is concealed by the bulbous forecoxae in the entire specimen, its presence may be inferred with certainty by the very evident white setae, arising from the edge of the prosternum, which may be seen, even in the type, between the coxae and the head. He also described the teeth on the outer margin of the foretibia as "short, very robust spinules." As shown by figure 18, *e*, these are neither short nor very robust as compared with those of many other scolytids. Also the antennal club in *Renocis heterodoxus* only appears to be "longer than the entire preceding portion." Actually it is considerably shorter (fig. 17, *h*).

It seems certain that Swaine's genus *Pseudocryphalus* would not have been proposed had Casey's description been more accurate, for the main characters in which his description differs from that of Casey have to do with the prosternum and the tibial teeth. Indeed, Swaine's description of *Pseudocryphalus* applies very closely to the type species of *Renocis*—much more closely than Casey's description.

LeConte's genus *Chaetophloeus* (figs. 17, *q*; 18, *o*), represented by the single species *C. hystrix* LeConte, is similar to *Renocis* in several respects such as body form and proportions, general structure of the frons, antennae, and eyes, and the strongly elevated and crenulate anterior margins of the elytra. It differs, however, in that the third joint of the tarsus is wider and distinctly emarginate; the pronotum is not strongly deflexed and its anterior margin does not have a fringe of specialized, coarse, erect setae; and the punctures throughout are coarse, deep, and close and give rise to erect, hairlike setae.

The genus *Renocis* as here constituted includes species that are strikingly different in superficial aspects and that indeed show differences in certain structures that in other groups might warrant including the species under several different genera. However, a careful study of both entire and dissected specimens shows that in the essential characters mentioned in the revised generic description the necessary uniformity exists. Forms as dissimilar superficially as *parkinsoniae*, *penicillatus*, and *braziliensis* show all the essential generic characters found in the type species, *heterodoxus*.

In the following key to the species of *Renocis* the chief consideration has been to make it useful in the ready separation of the species, rather than to attempt to express genetic relationships. If the latter purpose were to be considered of primary importance, it is felt that such species as *heterodoxus*, *commixtus*, *brittaini*, *criddlei*, and *brunneus* should perhaps be placed closer together. With these probable relationships ignored it is believed that a more workable key has resulted.

KEY TO THE SPECIES OF RENOCIS CASEY

1. Frons of female feebly to moderately impressed or concave, that of male more strongly concave; disk of elytra with median row of long erect setae in each interspace; declivity impressed or sulcate in sutural region----- 2
 Frons of female flat, that of male strongly, broadly concave; elytra with median row of setae in each interspace erect, but short, wide, and often scalelike; declivity not impressed or sulcate in sutural region----- 11
2. Base of pronotum procurved or deeply, broadly emarginate; elytral declivity strongly sulcate between the elevated third interspaces, with median rows of setae much reduced or lacking in first and second interspaces----- 3
 Base of pronotum procurved or shallowly emarginate; elytral declivity impressed or weakly sulcate in sutural area, with median rows of setae present in all interspaces----- 5
3. Large and stouter, about 1.7 times as long as wide; antennal club (fig. 17, *b*, *c*) very large and slender, 3 times as long as wide, distinctly longer than scape and funicle combined; pronotum with 3 groups of small, slender asperities at each side; anterior margins of elytra strongly elevated and serrate with median portion displaced posteriorly; declivity deeply and broadly sulcate, with setae in interspaces 3, 5, 7, and 9 more numerous, very large, terete; foretibia (fig. 18, *a*, *b*) with 9-14 teeth----- *parkinsoniae*, new species (p. 378)
 Smaller and less stout, at least 1.8 times as long as wide; antennal club (fig. 17, *d*) shorter than scape and funicle combined, less than 2.5 times as long as wide; pronotum with 2 groups of sharp asperities at each side; anterior margins of elytra strongly elevated and serrate, forming a continuous line; declivity broadly shallowly sulcate, with setae except in interspaces 1 and 2 moderately larger, spatulate; foretibia with fewer, slender teeth (fig. 18, *c*)----- 4
4. Frons with a low, granulate tubercle at each side of median line; pronotum with dark-brown scales forming a diamond-shaped median marking and an oblong spot at each side of disk; elytra with sutural light stripe and alternate fasciae of brown and of white scales; body form twice as long as wide----- *maclayi* (Bruck) (p. 382)
 Frons with sides finely granulate-punctate, without tubercle; pronotum with cinereous and light-brown scales, the latter forming an oblong spot at each side of disk; elytra with uni-

- formly cinereous scales, with no evidence of fasciae; stouter, about 1.8 to 1.85 times as long as wide.—*pruinosis*, new species (p. 383)
5. Declivity subsulcate, with first and second interspaces broad and nearly flat; pronotum with 2 groups of asperities at each side----- 6
 Declivity with first striae more strongly impressed, suture elevated, second interspaces convex; pronotum with 2 or 3 groups of asperities at each side----- 8
6. Smaller and stouter, about 1.75 times as long as wide; base of pronotum broadly, moderately deeply emarginate, with emargination bisinuate; front margin not bisinuate; elytra with median portion of serrate anterior margin displaced posteriorly; cinereous scales forming fascia across middle of elytra.
fasciatus, new species (p. 385)
- Larger and not so stout, more than 1.8 times as long as wide; base of pronotum broadly procurved, with median portion not bisinuate; front margin bisinuate; elytra with serrate anterior margin bisinuate, forming a continuous line; with no fascia of light scales across middle of elytra----- 7
7. Piceous-brown to black; with dark-brown and cinereous scales; frons often with coarse granule or tooth at each side; anterior tibia with 8 teeth on outer margin (fig. 18, *e*).
heterodoxus Casey (p. 387)
- Reddish brown; with cinnamon-brown and cinereous scales; frons granulate-punctate at sides, without special granule or tooth; anterior tibia with 10 teeth on outer margin (fig. 18, *f*).
brunneus, new species (p. 389)
8. Pronotum with 2 groups of asperities at each side, base nearly straight; elytra stouter, 1.25 times as long as wide, striae distinctly, equally impressed, with first not notably stronger; scales not concealing the surface, with few light ones; foretibia with 8 teeth on outer margin (fig. 18, *g*).
fuscus, new species (p. 391)
- Pronotum with 3 groups of asperities at each side, base procurved; elytra 1.4–1.5 times as long as wide, striae, except first, rather feebly impressed; scales concealing most of surface, many of them cinereous----- 9
9. Frons with a subtriangular concavity, the sides granulate-punctate; pronotum with anterior margin feebly sinuate at middle; elytra 1.4 times as long as wide; foretibia with 9–11 teeth on outer margin (fig. 18, *h, i*)-----*commixtus*, new species (p. 392)
- Frons feebly concave, with a coarse granule at each side; pronotum with anterior margin broadly emarginate at middle; elytra about 1.5 times as long as wide----- 10
10. Elytra with striae distinctly, rather strongly impressed, striae punctures rather coarse, deep, and distinct.—*brittaini* (Swaine) (p. 394)
- Elytra with striae very feebly impressed, punctures small and closely placed-----*criddlei* (Swaine) (p. 395)
11. Pronotum at base with sinuate emargination, with a pencil of long fine setae at each side just behind anterior margin, longer and more conspicuous in male; elytra with median portion of serrate anterior margins displaced posteriorly;

- each interspace with a row of conspicuous, erect, broad, scale-like setae; foretibia (fig. 18, *j*) with 6 long, slender teeth on outer margin.....penicillatus Bruck (p. 395)
- Pronotum procurved or emarginate at base, without a pencil of long setae; elytra with the serrate anterior margins forming a continuous line; each interspace with median row of scale-like setae, shorter and inconspicuous; foretibia with stout teeth on outer margin (fig. 18, *k-n*)..... 12
12. Black, almost exactly twice as long as wide, scales and setae mostly piceous with fewer cinereous scales; antenna (fig. 17, *n*) with club very large, more than twice as long as wide, as long as funicle and scape together; pronotum with asperities reduced to granules; elytra with marginal serrations supplemented by a row of 4 teeth just behind margin, 2 on each elytron; striae weakly impressed; foretibia (fig. 18, *k*) with 8 or 9 teeth on outer margin.....mexicanus, new species (p. 397)
- Reddish brown, less than 1.85 times as long as wide, clothed mostly in cinereous scales with a few fulvous ones; antennal club rather large, broadly oval, less than 1.6 times as long as wide, shorter than funicle and scape together; pronotum with asperities slender, but high and sharp; elytra with marginal serrations supplemented or not by a second row; striae distinctly impressed..... 13
13. Antennal club (fig. 17, *o*) 1.58 times as long as wide; pronotum with scales nearly uniformly cinereous; each elytron with a row of 7 or 8 teeth on anterior margin and a single tooth behind this row; foretibia (fig. 18, *l, m*) with 7-9 teeth on outer margin.....braziliensis, new species (p. 398)
- Antennal club (fig. 17, *p*) 1.33 times as long as wide; pronotum with cinereous scales at sides and behind, and fulvous ones on most of disk; each elytron with a row of 8 teeth on anterior margin and no supplementary ones; foretibia (fig. 18, *n*) with 4 short, stout teeth on outer margin....insularis, new species (p. 400)

RENOCIS PARKINSONIAE, new species

FIGURES 17, *b, c*; 18, *a, b*

Female.—Reddish brown, with most of scales small and with very coarse, erect, nearly white setae; 1.77 to 2.43 mm. long, holotype 2.2 mm. long, 1.7 times as long as wide.

Frons with epistoma subcarinate, shining in median line, with margin produced into a sharp median point, and with a fringe of nearly white slender setae, covering basal half of mandibles; arcuately, transversely impressed above epistoma, with impression widened in the median area to form a broad, short, shallow concavity between eyes, not strongly elevated at sides and above; surface reddish brown, moderately shining, very finely punctate, with interspaces very finely reticulate-granulate, with a few low granules at the sides and above; surface partly concealed by moderately coarse, light cinereous hairs, those at the sides and above being slightly more



FIGURE 17.—Species of *Renocis* and *Chaetophloeus*. (All drawings except *a* made from balsam mounts of dissections, with the aid of a compound microscope and a camera lucida. *a*, \times ca. 49; all others, \times 79.)

- a, g, h*, *Renocis heterodoxus* Casey: *a*, Prosternum, with coxae removed from coxal cavities to show presence of short prosternum, which is ordinarily concealed by bulbous forecoxae; *g*, antennal club of female; *h*, antenna of male.
- b, c*, *R. parkinsoniae*, new species: *b*, antenna of female; *c*, antennal club of male.
- d*, *R. pruinus*, new species: Antenna of female.
- e, f*, *R. fasciatus*, new species: *e*, Antennal club of male; *f*, antenna of female.
- i*, *R. brunneus*, new species: Antenna of male.
- j*, *R. fuscus*, new species: Antennal club.
- k, l*, *R. commixtus*, new species: *k*, Antennal club of male; *l*, antenna of female.
- m*, *R. penicillatus* Bruck: Antenna.
- n*, *R. mexicanus*, new species: Antenna of male.
- o*, *R. braziliensis*, new species: Antenna of male.
- p*, *R. insularis*, new species: Antenna of female.
- q*, *Chaetophloeus hystrix* LeConte: Antenna.

abundant and coarser. Eye scarcely 3 times as long as wide, finely granulate, inner line sinuate. Antenna (fig. 17, *b*) with club comprising more than one-half of total length, 3 times as long as wide, with three straight, setigerous, annulate sutures, setae slender.

Pronotum 1.53 times as wide as long, widest on posterior third; base with broad, deep, bisinuate emargination; sides strongly arcuate, constricted and transversely impressed just behind front margin, which is very broadly rounded, feebly sinuate in median area; surface reddish brown, finely, closely granulate-punctate; with three groups of rather long, sharp asperities at each side—anterior group, usually 2, just behind anterior margin; middle group, usually 2, back of transverse impression; posterior group, usually 3, on the posterior half; surface nearly concealed by small, stout scales, most of them light cinereous, except for an admixture of fulvous ones on anterior third of disk and extending backward at each side of posterior group of asperities; anterior margin with a fringe of coarse, moderately long setae, shorter in the median line; anterior row of fringe light cinereous, those behind testaceous to fulvous.

Elytra 1.2 times as long as wide, slightly wider than pronotum; sides straight and subparallel on anterior two-thirds, broadly rounded behind and strongly emarginate in median area; basal margins strongly elevated in each elytron from suture to fourth stria; each with six dark-brown teeth, the median three on each side displaced posteriorly, and more or less fused in a crescent-shaped row; striae narrow, moderately impressed except the first, punctures moderately coarse and close; interspaces weakly convex on disk, finely rugose punctate; surface on disk clothed with small, stout, semierect, scalelike, cinereous setae, and in the middle of each interspace a row of longer, erect setae, not flattened but terete, becoming much longer, coarser and blunt behind. Declivity originating just behind middle, sloping, deeply, broadly sulcate between the third interspaces, which are very strongly elevated, with both median and lateral setae very coarse, terete, longer and erect, forming a high ridge each side of sulcus; fifth, seventh, and ninth interspaces less strongly elevated, also with long, coarse setae; sulcus with suture slightly elevated; first striae impressed; second interspace narrow; setae lacking or nearly so in interspaces 1 and 2.

Ventral surface dark reddish brown, shining, sparsely clothed with nearly white, bifurcate scales except on last three abdominal segments; third and fourth segments with erect, fulvous, undivided setae except at sides; last segment as long as third and fourth combined, with erect, fulvous setae. Foretibia with 9–11 rather coarse teeth on outer margin, occasionally with teeth more numerous (fig. 18, *a, b*).



FIGURE 18.—Species of *Renocis* and *Chaetophloeus*. (Drawings made from balsam mounts of dissections, with the aid of a compound microscope and a camera lucida. $\times 79$.)

a, b, *Renocis parkinsoniae*, new species: a, Foretibia and tarsus of female; b, foretibia and tarsus of male.

c, *R. pruinosus*, new species: Foretibia of female.

d, *R. fasciatus*, new species: Foretibia of female.

e, *R. heterodoxus* Casey: Foretibia.

f, *R. brunneus*, new species: Foretibia and tarsus of male.

g, *R. fuscus*, new species: Foretibia.

h, i, *R. commixtus*, new species: h, Foretibia of male; i, foretibia of female.

j, *R. penicillatus* Bruck: Foretibia and tarsus.

k, *R. mexicanus*, new species: Foretibia of male.

l, m, *R. brazilensis*, new species: l, Foretibia of female; m, foretibia and tarsus of male.

n, *R. insularis*, new species: Foretibia and tarsus of male.

o, *Chaetophloeus hystrix* LeConte.

Male.—Similar in size and habitus to female, but with frons more deeply concave and frontal hairs more numerous and longer; antennal club longer and more slender, definitely longer than rest of antenna; anterior margin of pronotum with longer setae; pronotal asperities usually smaller; venter of last abdominal segment slightly shorter, with setae diverging from median line.

Type locality.—Catalina Springs, Ariz.

Additional localities.—Hot Springs and Sabino Canyon, Ariz.

Host.—*Parkinsonia microphylla* Torrey.

Type material.—Holotype, allotype, and 89 paratypes, U.S.N.M. No. 52949.

Remarks.—Holotype, allotype, and 74 paratypes were collected and bred from *Parkinsonia* at Catalina Springs, Ariz., by Hubbard and Schwarz; 3 paratypes from Hot Springs, Ariz., Barber and Schwarz; 12 paratypes collected from *Parkinsonia microphylla* at Sabino Canyon, Ariz., by George Hofer.

RENOCIS MACLAYI (Bruck), new combination

Pseudocryphalus maclayi BRUCK, Bull. Southern California Acad. Sci., vol. 35, pt. 1, p. 35; pt. 2, p. 122, 1936.

Female.—Dark brown, color pattern variegated with dark brown and nearly white scales and setae; paratype 1.82 mm. long, about twice as long as wide.

Frons with a short, sharp, median point on epistomal margin, with a fringe of light yellow-cinereous setae covering more than basal half of mandibles; transversely, arcuately impressed just above epistoma, broadly longitudinally impressed in median line; surface shining, finely, rather closely punctured, with fine, moderately sparse granules over most of surface; with a more strongly granulate, moderate elevation at each side, just mesad of upper angle of eye; surface mostly concealed by rather coarse recumbent and suberect setae, cinereous below and in median line, brown above. Eye about 3 times as long as wide, finely granulate, the inner margin broadly sinuate. Antenna with club slightly more than twice as long as wide, considerably shorter than remaining visible parts, with 3 nearly straight, annulate-setigerous sutures.

Pronotum about 1.5 times as wide as long, widest well in front of base, which is broadly procurved; sides strongly arcuate behind, strongly narrowed anteriorly; constricted and transversely impressed just behind the nearly straight, slightly sinuate front margin; surface dark brown, shining, finely, rather closely punctured, with interspaces minutely reticulate-granulate; with two groups of rather coarse, high asperities at each side; surface clothed with small, wide, recumbent, light-cinereous scales, which are nearly white over most of surface, but are brown in a median, irregular diamond-shaped or

“arrowhead-shaped” spot, and in a smaller, irregular-shaped spot at each side involving both groups of asperities; anterior margin with very sparse fringe of lighter brown, erect setae.

Elytra 1.28 times as long as wide, slightly wider than pronotum; sides subparallel on anterior two-thirds, broadly rounded behind; each basal margin strongly elevated from first to fifth interspace, with 6 coarse crenulations, very coarse nearest suture; striae distinctly but rather weakly impressed, with punctures moderate and fairly close; interspaces nearly flat, finely rugose punctate; surface nearly concealed by numerous small, rather narrow, semirecumbent scales, some of them brown and some very light cinereous; light scales forming the usual sutural stripe, and two broad fasciae, one in anterior half of elytra, the second involving entire face of declivity; each interspace with a median row of erect, broad, spatulate setae, brown or cinereous in color; each elytron with a dense group of erect brow setae just behind the basal elevation. Declivity moderately steep, very broadly sulcate between third interspaces, first and second interspaces flat, nearly devoid of erect median setae; third interspace rather high, with median erect setae more numerous than on disk, forming a partial double row.

Ventral surface dark brown, shining, sparsely clothed with white, recumbent, bifurcate scales, which are suberect on last three abdominal segments. Foretibia with six rather long teeth on outer margin.

Type locality.—Los Angeles County, Calif.

Host.—*Encelia californica* Nuttall.

Type material.—Holotype in collection of C. R. Bruck. Paratypes: Collection of California Academy of Sciences, San Francisco, Calif.; Canadian National Collection, Ottawa, Canada; Los Angeles Museum; collection of A. T. McClay.

Remarks.—The foregoing description was prepared from a paratype of *Pseudocryphalus maclayi* Bruck loaned by the Los Angeles Museum through the courtesy of Dr. John A. Comstock and Dr. W. Dwight Pierce. The paratype bears the data “Westwood Hills, L. A. Co. Cal., I.26.1936; *Encelia californica*; A. T. McClay, Collector.” From comparison with other species of *Renocis* it is believed that this paratype is a female. No other specimens have been seen by the writer.

RENOCIS PRUINOSUS, new species

FIGURES 17, *d*; 18, *c*

Female.—Light reddish brown, but appearing pruinose owing to light-cinereous scales; 1.8 to 2.25 mm. long; holotype 2.14 mm. long, 1.85 times as long as wide.

Frons with epistomal margin bearing a median sharp point, with a fringe of cinereous setae covering most of mandibles; with an arcuate transverse impression just behind the epistoma, which is widened in median area to a point well above the eyes, forming a median concavity; elevated at sides and above; surface brown, shining, finely punctate in concavity, finely and closely granulate-punctate at sides and above; clothed with moderately long, rather coarse, testaceous setae, more abundant at sides and above. Eye finely granulate, more than 3 times as long as wide, the inner margin rather weakly sinuate. Antenna (fig. 17, *d*) with club 2.22 times as long as wide, shorter than the remaining visible part of antenna, with 3 nearly straight sutures marked by annuli and rows of setae.

Pronotum about 1.4 times as wide as long, widest near base, which is broadly, shallowly emarginate; sides strongly arcuate from base to transverse impression just behind anterior margin, which is feebly, broadly sinuate in median area; surface reddish brown, moderately shining, very finely and densely punctate, the interspaces minutely reticulate-granulate; each side with two groups of rather high, slender asperities, with anterior group near transverse impression usually two in number, the posterior group usually four in number and nearly midway between anterior and posterior margins; surface clothed with small recumbent scales, light cinereous except for a small area of fulvous scales at each side involving both groups of asperities; anterior margin with a sparse fringe of fulvous setae, shorter than in most species of *Renocis*.

Elytra 1.2 times as long as wide, slightly wider than pronotum; sides straight and subparallel on anterior two-thirds, very broadly rounded behind with combined apices appearing broadly emarginate in median area; basal margins strongly elevated from first to fifth interspace, gradually becoming lower laterally, with six or seven crenulations on each side; first stria impressed, the others not at all or very feebly impressed, punctures rather coarse, wider than long and very closely placed as seen in denuded specimens; interspaces nearly flat, finely rugose-punctate, each with a sparse median row of slightly larger punctures, sometimes accompanied by feeble granules, surface almost completely concealed by numerous small, semi-recumbent, cinereous scales, which mask even the striae, each interspace with a median row of short, stout, erect, fulvous setae, longer on the declivity; each elytron with a dense group of erect, brown setae just behind the basal elevation. Declivity steep, very broadly sulcate in the sutural area between the third interspaces of the elytra; third interspace elevated, with a few feeble granules, the median row of setae nearly lacking on interspaces 1 and 2 and replaced by a double row of longer, coarser setae on third interspace, causing the

sulcus to appear deeper than it actually is. Ventral surface reddish brown, shining, rather sparsely clothed with nearly white, recumbent, bifurcate scales, those on the last three abdominal segments being suberect and some of them entire. Foretibia (fig. 18, *c*) each with six rather large teeth on outer margin.

Male.—Similar in size and habitus, but with the frons concave for entire width, thinly clothed with hairs, with abundant, coarser, longer, fulvous hairs at sides; pronotum with posterior group of asperities poorly developed; venter of last abdominal segment with hairs directed laterally.

This species is rather closely related to *Pseudocryphalus maclayi* Bruck but differs in the absence of the frontal tubercles, in the notably stouter form, in the uniformly light-brown body color, and in the very different color pattern formed by the scales.

Type locality.—Southern California.

Additional locality.—Catalina Springs, Ariz.

Host.—*Encelia farinosa* A. Gray.

Type material.—Holotype, allotype, and 12 paratypes, U.S.N.M. No. 52950.

Remarks.—Holotype, allotype, and 7 paratypes are from the Coquillett collection, taken in San Bernardino County, Calif.; 1 paratype, labeled "Cal."; 1 specimen without data; 3 paratypes—"Catalina Springs, Ariz., Coll. Hubbard and Schwarz, on *Encelia farinosa*."

RENOCIS FASCIATUS, new species

FIGURES 17, *e*, *f*; 18, *d*

Female.—Piceous black, clothed with cinnamon-brown and light-cinereous scales; 1.45 to 1.8 mm. long; holotype 1.57 mm. long, 1.75 times as long as wide.

Frons with epistomal margin ending in a sharp median point, with a fringe of moderately long, rather fine, yellowish hairs, shorter and sparser at middle, reaching nearly to tips of mandibles at sides; arcuately, transversely impressed above epistoma, with impression widened and forming a subtriangular concavity extending to just above eyes; surface piceous, shining, finely and closely granulate-punctate, elevated and more strongly granulate at sides and above; surface of concavity partly concealed by rather short, moderately coarse, cinereous setae, which are longer and more abundant above and at sides. Eye about 3.3 times as long as wide, finely granulate, inner line shallowly, broadly emarginate. Antenna (fig. 17, *f*) with club comprising nearly half of visible length, slightly more than twice as long as wide, with three straight, annulate-setigerous sutures, setae rather long and slender.

Pronotum 1.6 times as wide as long, widest one-fourth of distance from base, which is broadly, strongly procurved, sides strongly arcuate, greatly narrowed anteriorly; a weak transverse impression just behind front margin, which is very broadly rounded, not sinuate in middle; surface piceous, shining, finely and densely granulate-punctate; at each side with two small groups (usually 2-4) of minute, sharp, inconspicuous asperities, those of anterior group (usually 2) slightly larger, one-fourth of distance from anterior margin to base; surface partially concealed by numerous small recumbent scales, some of them cinnamon-brown, some cinereous, the latter forming a wide border at each side of disk, a narrow transverse band on posterior margin, and a median stripe, broad at posterior and anterior margins, and interrupted, or nearly so, midway; with cinnamon-brown scales elsewhere, extending to anterior margin; anterior margin with a dense fringe of longer, coarse, erect setae, shorter and nearly lacking in middle.

Elytra 1.17 times as long as wide, wider than pronotum; sides straight and subparallel on anterior two-thirds, very broadly rounded behind, the apex broad and subtruncate; basal margins strongly elevated near suture, gradually becoming lower from suture to fifth interspace at each side; with distinct black crenulations, those near suture arranged in an approximate quarter circle, the lateral ones opposite the third and fourth interspaces, at each side and progressively lower; striae rather narrow, first two deeper, but all distinctly impressed, punctures moderately fine and close; interspaces convex but appearing flat in unabraded specimens, rugose, very finely punctured, with a few feebly developed granules on the disk; surface masked by small recumbent scales, part of them cinnamon-brown and others very light cinereous, the latter forming in the type specimen a broad stripe in the sixth and seventh interspaces, a broad transverse band just back of the middle, and a stripe involving most of the sutural interspaces from the fascia to the apex; each interspace with a median row of short, suberect, brown, inconspicuous setae, which are slightly longer on the declivity; each elytron with a dense group of coarse, testaceous setae just posterior to the basal crenulations. Declivity steep, broadly, shallowly impressed, subsulcate in the sutural region, with a few small, blunt granules in the third interspace above.

Ventral surface sparsely clothed with nearly white, usually bifurcate scales anterior to third abdominal segment, those on third and fourth segments mostly light brown, erect, and more numerous, many bifurcate; fifth segment finely and closely punctured, pubescence brown, erect. Foretibia (fig. 18, *d*) with 8 teeth on the outer margin.

Male.—Similar in size and habitus to female; with antennal club (fig. 17, *e*) larger and more slender, more than 2.5 times as long as

wide; frontal hairs longer and frontal concavity apparently deeper; last abdominal segment with setae parted in median line.

This species ranges in size from 1.45 to 1.8 mm. long and differs considerably in color pattern owing to differences in the abundance and arrangement of the light scales. In a few specimens the elytral fascia is reduced and nearly absent, while in others it is broad and conspicuous.

Type locality.—Tucson, Ariz.

Other localities.—Arizona and Benson, Ariz.

Hosts.—Greasewood [*Covillea gentryana* (Engelmann) Rydberg], mesquite (*Prosopis* sp.).

Type material.—Holotype, allotype, and 39 paratypes, U.S.N.M. No. 52951.

Remarks.—Holotype, allotype, and 30 paratypes are from greasewood, Tucson, Ariz.; 6 paratypes from cut twigs of mesquite, Benson, Ariz., Mr. Chissman, Coll.; 3 paratypes from "twigs of mesquite, Arizona, collection Wickham."

RENOCIS HETERODOXUS Casey

FIGURES 17, *a, g, h*; 18, *e*

Renocis heterodoxus CASEY, California Acad. Sci. Bull. 6, pp. 257-259, 1886.—SWAINE, New York State Mus. Bull. 134, p. 144, 1909.—BRUCK, Bull. Southern California Acad. Sci., vol. 35, pt. 2, pp. 119-120, 1936.

Type, a male.—Piceous-black, densely clothed with small scales, some dark brown and others cinereous in color, with brown or ashen, erect, spatulate setae; 1.8 mm. long, almost exactly twice as long as wide.

Frons with epistomal margin bearing a fringe of coarse, cinereous, downwardly directed setae, with a short, sharp tooth in middle; transversely impressed just behind the epistoma and broadly longitudinally impressed in median area to a point above the eyes, forming a rather shallow, subtriangular concavity; sides slightly elevated; surface shining, finely, rather sparsely punctured in median concavity, more coarsely, densely, and roughly punctate-granulate at the sides and above, often with a large granule or tooth at each side at level of upper angles of eyes; clothed with moderately long, light-brown setae, scanty below, abundant, longer, and shaggy at sides and above, concealing the surface. Eye nearly 3.5 times as long as wide, finely granulate, with inner line sinuate. Antenna (fig. 17, *h*) brown, funicle 5-jointed, longer than scape; club 2.26 times as long as wide, about as long as funicle and exposed part of scape together, with three nearly straight sutures marked by annuli and rows of setae, not septate.

Pronotum 1.52 times as wide as long, widest near base, which is nearly straight, feebly procurved; sides strongly arcuate behind,

strongly constricted in front of middle, with a transverse impression just behind the anterior margin, which is broadly rounded, slightly sinuate in median line; disk finely and densely punctate-granulate; with two small groups (2-4) of small, slender asperities at each side, one group just behind transverse impression, and behind this another group (usually only 2) of smaller ones; entire surface densely clothed with small recumbent scales, those at sides and on posterior third of disk light cinereous with a few brown ones intermixed, those on anterior median disk brown; a dense fringe of erect, brown scales (or short (spatulate setae) on the anterior margin.

Elytra 1.29 times as long as wide, very slightly wider than pronotum; sides straight and subparallel on basal two-thirds, semi-circularly rounded behind; basal margins very strongly elevated in scutellar region, becoming lower laterally and lacking lateral to fifth interspace, with 5 coarse, high serrations each side of suture; first and second striae moderately, the others more weakly impressed, punctures small, separated by less than their own diameters; interspaces feebly convex, rugose, very finely punctured, each with a median row of slightly coarser punctures, often accompanied by small granules, surface masked by numerous small recumbent scales, most of them brown, but nearly all those in first interspace and a few in other interspaces light cinereous, nearly white; with a single median row of erect, spatulate setae, usually brown, in each interspace; each elytron with a dense group of erect, brown setae just behind the crenate anterior margin. Declivity moderately sloping, with first and second interspaces broad and nearly flat, slightly depressed below level of third interspaces, which bears a few feeble granules.

Ventral surface piceous-brown, sparsely clothed with divided scales, which are cinereous except on last three abdominal segments, where they are light brown, longer, erect, and for the most part entire, but some bifurcate. Foretibia narrow at base, dilated distally, with eight moderately slender teeth on outer margin.

Female.—Similar to male but with frontal concavity shallower, frontal hairs shorter, antennal club slightly broader (fig. 17, *g*); pronotal asperities more strongly developed; pubescence on last abdominal sternite erect, not modified in median line.

Remarks.—The foregoing description of the male was prepared almost entirely from the type, which was collected near Reno, Nev. For a number of details, however, recourse was had to other specimens because of the obscuring of certain structures of the type by dirt. All measurements were made from the type except those of the antennae. For these dissections of other specimens mounted in balsam were used, it being impossible to make accurate measurements of such small structures on entire specimens.

Both the males and females show some degree of variation. The size ranges from 1.5 to 2.4 mm. long. The color pattern varies considerably, being dependent upon differently colored scales and setae against the background of the actual body color and upon the relative abundance and arrangement of the differently colored scales. As is usually true in various species of *Renocis*, the pronotal asperities or teeth are better developed in the female than in the male, but in each sex there is considerable variation. The type, a male, shows little indication of frontal tubercles, although the frontal hairs are partly abraded and if present the tubercles would be plainly seen. This seems to be true of most of the specimens of both sexes, although a few of each sex do show more or less feebly developed tubercles or large granules. Usually, however, these structures, unless exceptionally large, are well concealed by the frontal hairs.

Type locality.—Reno, Nev.

Type.—Casey collection, U.S.N.M. No. 37439.

Specimens studied by the writer include the type from Reno, Nev., specimens from Blacksmith Fork Canyon, Logan Canyon, Park City, and Dixie National Forest, Utah; Bray, Calif.; and Neil Creek and Ashland, Oreg. The recorded hosts are *Amelanchier florida* Lindley, *Cercocarpus betuloides* Nuttall, *C. alnifolius* Rydberg, *C. ledifolius* Nuttall, and *Prunus virginiana melanocarpa* (A. Nelson) Sargent.

RENOCIS BRUNNEUS, new specie

FIGURES 17, *i*; 18, *f*

Female.—Light reddish brown, clothed with cinnamon-brown and with light-cinereous scales; 1.7 to 2.17 mm. long.; holotype 2.1 mm. long, 1.96 times as long as wide.

Frons with epistomal margin bearing a sharp point in median line, with a fringe of moderately coarse, yellowish setae covering two-thirds of the mandibles; arcuately, transversely impressed above the epistoma, the impression somewhat widened in median area to upper angle of eyes (not extending dorsally as far as in most species); surface reddish brown, shining, the concavity finely punctate, the sides and dorsum densely, finely granulate-punctate; with a feeble elevation (tubercle) at each side at level of upper angle of eye; surface of concavity partly concealed by moderately short, coarse, light-brown setae, that of the lateral and dorsal elevations almost entirely concealed by more numerous longer ones. Eye approximately 3 times as long as wide, finely granulate, the inner line broadly, shallowly sinuate. Antenna with club (fig. 17, *i*) 2.25 times as long as wide, as long as the remaining visible part of antenna, with three sutures marked by annuli and rows of setae.

Pronotum 1.6 times as wide as long, widest near base, which is broadly procurved medially; sides strongly arcuate on posterior two-thirds, then constricted and distinctly transversely impressed just behind the very broadly rounded front margin, which is sinuate (broadly and shallowly emarginate) in middle; surface shining, reddish brown, finely and closely granulate-punctate; at each side with two small groups of rather small asperities, about one-fourth and one-half of the distance from anterior margin, each group usually with three or four asperities, united in transverse line; with a few very low, weak asperities anteriorly in transverse impression; surface partly masked by numerous small, recumbent scales, those at sides and on posterior third consisting of many nearly white, cinereous ones with a few cinnamon-brown ones intermixed, those on rest of disk mostly cinnamon-brown; anterior margin with a sparse border of moderately long, coarse, brown, erect setae, shorter in middle.

Elytra 1.3 times as long as wide, slightly wider than pronotum; sides straight and subparallel on anterior two-thirds, broadly rounded behind; basal margins strongly elevated in median area, gradually becoming lower to fifth interspace on each elytron, with about 6 crenulations in a continuous line at each side; striae narrow, distinctly impressed, the first two deeper, punctures moderately small and close; interspaces convex, finely rugose-punctate, with a sparse median row of slightly larger punctures and a few feeble granules; surface rather sparsely clothed with small, recumbent scales, some of them a cinnamon-brown and some very light cinereous, the latter less numerous, intermixed with the darker scales in no definite pattern except for a narrow stripe in the sutural interspaces; each interspace with a median row of stout, erect, brown setae; each elytron with a dense group of brown setae just behind the basal margin. Declivity moderately steep, broadly, shallowly impressed in the sutural region, with a few fine low granules in the second and third interspaces, visible only in denuded specimens.

Ventral surface reddish brown, shining, sparsely clothed with nearly white, recumbent, usually bifurcate scales except on the last three abdominal segments, those on last three segments mostly brown, mostly entire, erect. Foretibia (fig. 18, *f*) with 10 teeth on outer margin.

Male.—Similar in size and habitus to female; antennal club more slender; frons similar to female except that the lateral hairs are longer and more abundant, and the frontal concavity is deeper; last abdominal segment with setae parted in median line.

This species shows about the usual variation in size; the pronotal asperities vary in development; the greatest differences are in the relative abundance and distribution of the light and dark scales.

Type locality.—Cloudcroft, N. Mex.

Host.—Unidentified shrub.

Type material.—Holotype, allotype, and 17 paratypes, U.S.N.M. No. 52952.

Remarks.—Holotype, allotype, and 17 paratypes under Hopkins U. S. Nos. 3977 and 3988, collected from and bred from an "unknown shrub" at Cloudcroft, N. Mex., by W. F. Fiske.

RENOCIS FUSCUS, new species

FIGURES 17, *j*; 18, *g*

Female.—Piceous-brown, clothed with scales varying from cinereous to fuscous; 1.88 mm. long, 1.9 times as long as wide.

Frons with sharp median point on epistomal margin, with a dense fringe of yellowish-cinereous setae; transversely impressed above the epistoma, with impression widened dorsally to form a concavity; sides and vertex convex; surface black, shining, finely and densely punctate, with fine granules at sides and above; surface partly concealed by coarse, rather long, light-brown setae, more abundant and longer at the sides and above. Eye more than 3 times as long as wide, finely granulate; inner margin feebly sinuate. Antenna with club (fig. 17, *j*) subacuminate at tip; 2.5 times as long as wide; with 3 straight, annulate-setigerous sutures.

Pronotum 1.6 times as wide as long, widest one-third of distance from base, which is feebly procurved; sides strongly arcuate behind, strongly constricted before middle; front margin broadly rounded, sinuate in middle; with a sparse fringe of erect, spatulate, fulvous setae, shorter in middle, with a transverse impression just back of anterior margin; surface piceous, shining, rather closely, finely punctate, finely granulate; at each side two groups (2 or 3 in each) of very small asperities; surface nearly concealed by numerous, small, recumbent scales, arranged as a broad band at the base and at sides, made up largely of broad and narrow cinereous scales intermixed, and on anterior two-thirds of disk small, broad, fulvous scales.

Elytra 1.25 times as long as wide, wider than pronotum; sides straight and subparallel on anterior two-thirds, broadly rounded behind; basal margin strongly elevated from suture to sixth interspace, with six or seven crenulations at each side, forming a continuous line; striae moderately narrow, distinctly impressed, punctures fine and close; interspaces broad, flat, surface shining, finely punctate, with a median row of slightly coarser punctures, rather sparsely clothed with numerous small, rather slender, recumbent, fuscous scales; in the median line of each interspace a row of erect spatulate setae, appearing cinereous in certain lights and fuscous brown in other lights; each elytron with a group of coarse, erect, fuscous setae

just behind the anterior crenulate margin. Declivity evenly arched, not sulcate, but with first and second striae more deeply impressed, the interspaces weakly convex.

Ventral surface dark reddish brown, shining, sparsely clothed with nearly white, bifurcate, recumbent scales, except on the last three abdominal segments, which have erect, fulvous setae. Foretibia (fig. 18, *g*) with eight rather long, slender teeth on outer margin.

Type locality.—Williams, Ariz.

Host.—*Cowania mexicana* D. Don.

Type material.—Holotype and one paratype, U.S.N.M. No. 52953.

Remarks.—Holotype and one paratype taken from *Cowania mexicana* at Williams, Ariz., by Schwarz and Barber. These two specimens were associated with numerous specimens of *Renocis commixtus*, new species.

RENOCIS COMMIXTUS, new species

FIGURES 17, *k*, *l*; 18, *h*, *i*

Female.—Brown to piceous, clothed with intermixed brown and ashy-white scales and setae; 1.6 to 2.2 mm. long; holotype 2.0 mm. long, almost exactly twice as long as wide.

Frons with a short sharp point in median line of epistomal margin, with a dense fringe of rather long, coarse, yellowish hair; transversely impressed above the epistoma, with this impression much widened in the median area forming an approximately triangular concavity, with the sides elevated and granulate-punctate; surface shining, concavity finely, not closely punctured, scantily covered by coarse, moderately long, fulvous hairs, which are much more abundant and conceal the surface at the sides and above. Eye finely granulate, 3.3 times as long as wide, the anterior margin distinctly sinuate. Antenna (fig. 17, *l*) with the club 2.4 times as long as wide, as long as funiculus and visible part of scape together, with three nearly straight setigerous-annulate sutures.

Pronotum 1.5 times as wide as long, widest near the base, which is procurved; the sides strongly arcuate on the posterior two-thirds, strongly constricted in front of middle, with a moderate transverse impression behind anterior margin, which is broadly rounded, very feebly or not at all sinuate in middle; surface shining, finely and densely granulate-punctate, with three small groups of small sharp asperities on each side, one group just behind anterior margin, one behind the transverse impression, and a third group two-fifths of distance between second group and posterior pronotal border, surface clothed with small recumbent scales, those on the anterior part of disk brown, those on sides and on posterior part of disk a variable mixture of brown and nearly white scales; anterior pronotal margin

with a dense fringe of longer, erect, brown, spatulate setae, shorter in the median line and much longer at each side.

Elytra 1.4 times as long as wide, slightly wider than pronotum; sides straight and subparallel on basal two-thirds, moderately broadly rounded behind (more narrowly than in *heterodoxus*); basal margins strongly elevated in scutellar region, gradually becoming lower from suture to fifth interspace on each elytron, usually with 6 rounded serrations at each side, in a continuous line; striae narrow, impressed, the first more strongly than the others, punctures small and close; interspaces feebly convex, rugose, very finely punctured, each with a median row of larger punctures often accompanying small blunt granules; surface masked by small recumbent scales (not so numerous as in *heterodoxus*), most of these in type, brown except for a light-colored median stripe in sutural interspaces, while the third, fifth, and seventh interspaces contain many light-cinereous scales in their anterior thirds (some specimens have throughout a "pepper-and-salt" mixture of dark and light scales); each interspace with a median row of erect, rather short, coarse setae, most of them brown but a few pale; each elytron with a dense group of coarse, dark-brown setae just behind the elevated anterior margin. Declivity steeper than in *heterodoxus*, the first striae impressed but first and second interspaces normal, feebly convex.

Ventral pubescence light cinerous except on last 3 abdominal segments, most of scales bifurcate or trifurcate; 3 posterior abdominal segments with entire, coarse, brown, suberect setae; last segment with erect setae, with posterior margin but little narrower in middle. Foretibia (fig. 18, *h, i*) with 9–11 teeth on outer margin.

Male.—Similar in habitus to female, with the antennal club (fig. 17, *k*) slightly longer and more slender; frons more strongly concave; pronotal asperities more feebly developed; last abdominal sternite with posterior rim very feebly emarginate and the setae parted in the median line.

This species shows a considerable range of variation in size (1.6 to 2.2 mm. long), in arrangement of the light and dark scales and setae, and in sculpture, the pronotal asperities especially varying both in number and in coarseness.

Type locality.—Williams, Ariz.

Additional localities.—Colorado Springs and North Cheyenne Canyon, Colo.

Host.—*Cowania mexicana* D. Don.

Additional hosts.—*Prunus americana* Marshall, apple, wild currant.

Type material.—Holotype, allotype, and 162 paratypes, U.S.N.M. No. 52954.

Remarks.—Holotype, allotype, and 146 paratypes were collected and bred from twigs of *Cowania mexicana* at Williams, Ariz., by Barber and Schwartz. Sixteen paratypes are from Colorado Springs and Cheyenne Canyon, Colo., bred from *Prunus americana* or collected on wild currant and apple by B. T. Harvey.

RENOCIS BRITAINI (Swaine), new combination

Pseudocryphalus brittaini SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 1, p. 20, 1917; pt. 2, p. 57, 1918.—BRUCK, Bull. Southern California Acad. Sci., vol. 35, pt. 1, p. 35; pt. 2, p. 121, 1936. (Genotype of *Pseudocryphalus* Swaine.)

"Length, 1.9 mm.; stout, black, with brown and gray scales; the front plano-concave, with a strong transversely arcuate impression behind the epistoma, the middle line impressed, clothed with stout pubescence, becoming long, dense and pale on the epistomal margin, with a rather coarse granule behind the impression on each side the middle line; the eyes long, narrow, extending upon the ventral surface.

"The pronotum twice as wide as long; the sides very strongly rounded behind and very strongly constricted in front; the front margin broadly emarginate at the middle; very densely subgranulately punctured, clothed with brown and grey, very stout pubescence, the grey predominating on the sides and behind; the cephalic margin unarmed or nearly so, somewhat elevated, with pale fine pubescence and brown, elongate, elevated scales; with three pairs of elongate recurved rugosities in a longitudinal row on the middle of each side in front, the first pair on the front margin.

"The elytra as wide as the pronotum, slightly less than one-half longer than wide, the basal margin very strongly elevated, recurved and coarsely serrate in the scutellar region; the sides subparallel on the basal half, broadly rounded behind; the striae distinctly, rather strongly impressed, the strial punctures rather coarse, not close, deep and distinct, bearing very minute setae; the interspaces feebly convex, minutely punctured, and with a median row of granules, bearing very small, elongate scales which hardly cover the surface, and a median row of longer, erect, very stout bristles; the pubescence brown, with numerous scattered white scales, more abundant toward the base and forming a narrow band along the suture; the first two abdominal sternites subequal in length, each longer than the next two united.

"Salmon Arm, B. C.; apple trees, in dying bark."

The above is Swaine's original description quoted verbatim. No specimen of the species has been seen by the writer.

Types in Canadian National Collection, Ottawa, Canada.

RENOCIS CRIDDLEI (Swaine), new combination

Pseudocryphalus criddlei SWAINE, Canada Dept. Agr., Ent. Branch, Bull. 14, pt. 1, p. 21, 1917; pt. 2, p. 58, 1918.

"This species is very closely allied to *brittaini*; with the same size, form, and colour; but it is apparently distinct through the very feebly impressed elytral striae, and the small, very closely placed striae punctures.

"Series of 108 specimens from Aweme, Man., *Prunus virginiana*; collected by Mr. Norman Criddle."

Swaine's original description is quoted verbatim. The writer has seen no specimen of this species.

Type and paratypes are in the Canadian National Collection, Ottawa, Canada.

RENOCIS PENICILLATUS Bruck

FIGURES 17, *m*; 18, *j*

Renocis penicillatus BRUCK, Can. Ent., vol. 65, p. 239, 1933; Bull. Southern California Acad. Sci., vol. 35, pt. 2, p. 120, 1936.

Female.—Piceous with cinereous scales and hairs; with two pencils of long setae just behind front margin of pronotum; 1.14 to 1.6 mm. long, about 1.8 times as long as wide.

Frons with a median point on epistomal margin; with a fringe of nearly white setae covering basal halves of mandibles; nearly flat, feebly impressed just above epistoma and in median line; surface piceous, shining, finely and closely punctate-granulate; clothed with coarse, moderately long, testaceous setae, slightly longer at sides and above. Eye slightly more than 3 times as long as wide, finely granulate, inner margin sinuate. Antenna (fig. 17, *m*) with club not much longer than funicle, slightly more than twice as long as wide, with distal end subacute, with three nearly straight annulate-setigerous sutures.

Pronotum 1.57 times as wide as long, widest near base, which is very broadly, rather deeply emarginate in median half; sides strongly arcuate posteriorly, strongly narrowed in anterior half; transversely impressed just behind anterior margin, which is broadly rounded, sinuate in median area; surface piceous, shining, very finely granulate-punctate, with less numerous, coarser, but still fine punctures interspersed; at each side with three groups of high, rather slender asperities or teeth, each group consisting of 2 or 3 teeth, posterior group just behind middle, second group just behind transverse impression, anterior group, smaller and occasionally lacking, on anterior margin; surface clothed with small cinereous scales, consisting of numerous narrow, recumbent ones, and less numerous (from coarser punctures), broad, suberect, cinereous scales; with a group of long cinereous hairs each side of median line, just behind anterior margin.

Elytra about 1.4 times as long as wide, slightly wider than pronotum, with sides straight and subparallel on anterior two-thirds, moderately broadly rounded behind, basal margin strongly elevated in scutellar region, including the fourth interspace at each side, with four or five serrations or crenulations on each elytral margin, not forming a continuous line; striae impressed, the first more deeply, nearly as wide as interspaces, punctures close and of moderate size; interspaces moderately convex, finely rugose punctate, each with a few feeble granules accompanying a median row of slightly coarser punctures, clothed with narrow recumbent scales, prevailing cinereous on the sutural interspaces and on the basal third, somewhat fulvous on the posterior disk and declivity; each interspace with a median row of erect, spatulate, fulvous setae; each elytron with a group of coarse, fulvous setae behind the crenulate anterior margins. Declivity rounded, unmodified, first striae impressed as on disk.

Ventral surface piceous-brown, shining, thinly clothed with nearly white, usually bifurcate, recumbent scales, which on the last three abdominal segments are more nearly erect and are mixed with fulvous setae. Foretibia (fig. 18, *j*) not so strongly widened distally as in most other species, with 6 long, slender teeth on outer margin.

Male.—Similar in size and habitus to female; with frons deeply concave and bordered on sides and above by numerous long setae; pronotum with posterior and anterior groups of asperities smaller than in female, sometimes lacking; with the tufts of hairs near anterior margin much longer, penicillate; setae on venter of last abdominal segment parted in median line.

Location of type material.—Holotype, allotype, and 25 paratypes in collection of C. R. Bruck. Paratypes: California Academy of Sciences, San Francisco; Canadian National Collection, Ottawa, Canada; collection of A. T. McClay.

Remarks.—This is a rather widely spread species and apparently is not confined to one host. *Renocis penicillatus* was described from material obtained from *Rhus integrifolia* and *R. ovata* in southern California. The writer has studied four specimens from Bruck's series, one obtained through the kindness of Dr. W. Dwight Pierce of the Los Angeles Museum and three specimens kindly lent by Prof. J. N. Knull from his own collection. These specimens are identical in all essential respects with more than 50 specimens in the National Museum from Arizona, Utah, and Colorado, collected by Hubbard and Schwarz, Hopkins, Webb, Wickham, and Harvey, and four specimens collected from *Rhus ovata* at Ensenada, Lower California, by F. P. Keen. Only in the last case is the host cited specifically, but in the Hopkins series from Flagstaff, Ariz., it is described as "shrub resembling currant," probably *Ribes* sp.

RENOCIS MEXICANUS, new speciesFIGURES 17, *n*; 18, *k*

Female.—Black, clothed with piceous-brown scales forming a variegated color pattern with light cinereous, nearly white scales; 1.31 to 1.88 mm. long; holotype 1.72 mm. long, 2.0 times as long as wide.

Frons with a sharp median point on epistomal margin, and with a dense fringe of moderately fine, yellow-cinereous setae extending halfway to tips of mandibles; transversely impressed above epistoma, with center of frons flattened, feebly concave, sides and vertex convex; surface black, feebly shining, very finely and densely granulate-punctate; surface mostly concealed by coarse, rather short, fuscous setae, only slightly longer at sides and above. Eye finely granulate, about 3.3 times as long as wide, the inner line broadly and shallowly emarginate. Antenna (fig. 17, *n*) with club very large, longer than the scape and funicle combined, 2.19 times as long as wide, with three nearly straight sutures, both annuli and setae reduced in median line of outer face of club.

Pronotum 1.47 times as wide as long, widest near base, which is broadly procurved; sides strongly arcuate, nearly evenly narrowed anteriorly with front margin very broadly rounded, feebly sinuate in middle, with a very feeble, transverse impression just back of the margin; surface piceous, feebly shining, finely and densely granulate-punctate; at each side with two very inconspicuous groups of several slightly coarser granules (not sharp asperities as in other species of *Renocis*), almost entirely concealed except in abraded specimens; surface largely concealed by numerous scales, some of them narrow, recumbent ones and some wide and semierect, mostly piceous except for a transverse, basal band and a lateral border of light-cinereous scales; anterior margin with a sparse fringe of erect, dark brown, spatulate setae, interrupted in the middle.

Elytra 1.43 times as long as wide, slightly wider than pronotum; sides straight and subparallel on anterior two-thirds, rather narrowly rounded behind; basal margin strongly elevated from suture to opposite sixth interspace, with 8 distinct teeth in a continuous line on margin of each elytron, and with a second row of four coarse teeth, two at each side of suture, just behind margin; striae, except first, rather feebly impressed, punctures moderate in size, close; interspaces wider than striae, feebly convex, rugose, finely punctate, with a few small granules; surface partly concealed by small recumbent scales, most of them piceous, but with a narrow stripe of light-cinereous scales in anterior half of sutural interspaces and continued posteriorly as a single row of light scales next to suture, at each side an irregular spot of light scales in anterior half of fifth to seventh interspaces; in median line of each interspace a row of very broad,

flat, erect setae or scales, short on anterior disk, but becoming larger posteriorly; each elytron with a dense group of coarse, piceous-brown setae behind the anterior margin. Declivity evenly arched, not sulcate; first striae more strongly impressed, as on disk; punctures finer.

Ventral surface shining, piceous; clothed with nearly white, usually bifurcate, recumbent scales anterior to third abdominal segment, last three segments with erect, fuscous scales except at the sides of the third. Foretibia (fig. 18, *l*) with eight occasionally nine) rather short, stout teeth on outer margin.

Male.—Similar in size and habitus to female, but with the frons strongly concave and with longer hairs at sides and above; antennal club larger and more slender, 2.28 times as long as wide; last abdominal segment slightly shorter, with the setae parted in median line.

In this species the chief variations are in the size and in the color pattern formed by the light and the dark-colored scales.

Type locality.—Guadalajara, Jalisco, Mexico.

Other locality.—Mexico.

Host.—*Eysenhardtia* sp.

Type material.—Holotype, allotype, and 136 paratypes, U.S.N.M. No. 52955.

Remarks.—The type, allotype, and 11 paratypes are from Guadalajara, Mexico, intercepted at quarantine, Nogales, Ariz., in packing crates made of *Eysenhardtia* sp. (wood determined by Prof. S. J. Record); 48 paratypes from *Eysenhardtia* sp. (determined by W. N. Watkins), Mexico, September 11 and 24, 1936; 77 other paratypes were intercepted at quarantine from Mexico, but there are no data either as to host or locality of origin.

RENOCIS BRAZILIENSIS, new species

FIGURES 17, *o*; 18, *l*, *m*.

Female.—Reddish brown, clothed with light-cinereous, nearly white scales and setae; 1.31 to 1.63 mm. long; holotype 1.48 mm. long, 1.7 times as long as wide.

Frons with a very small median point on epistomal margin, with fringe of rather fine, yellow-cinereous setae extending halfway to tips of mandibles; arcuately, transversely impressed above epistoma, with center of frons flat, sides and vertex rounded; surface reddish brown, moderately shining, finely, densely granulate-punctate; surface partly concealed by rather short, stout, cinereous setae, only slightly longer at the sides and above. Eye about 3.5 times as long as wide, finely granulate, inner margin sinuate, subemarginate. Antenna (fig. 17, *o*) with club broad-oval, 1.58 times as long as wide, with three nearly straight, annulate-setigerous sutures, the funicle attached dorsad of its axis.

Pronotum 1.6 times as wide as long, widest near base, which is very broadly emarginate in median half; sides strongly arcuate behind, constricted anteriorly; front margin very broadly rounded, feebly sinuate in median area; with a weak transverse impression just behind margin, which bears a sparse fringe of erect, spatulate, cinereous setae, slightly shorter in median area; surface reddish brown, shining, finely punctate, reticulate-granulate; at each side with two groups of fine, sharp asperities (3 or 4 in each group), one group on anterior third, the other on posterior half of disk; surface rather sparsely clothed with numerous, small, recumbent, cinereous scales, varying from narrow to broad; with a few erect setae in median line near base.

Elytra 1.22 times as long as wide, very slightly wider than pronotum; sides straight and subparallel on anterior two-thirds, very broadly rounded behind; basal margin strongly elevated between the sixth interspaces, with a continuous, somewhat bisinuate line of teeth, 7 or 8 on each elytron, and with a smaller tooth just behind margin in each sutural interspace; striae distinctly impressed, about one-half as wide as interspaces, punctures close, moderate in size; interspaces weakly convex, finely rugose-punctate with a few feeble granules, punctures in median line of each interspace slightly larger; surface reddish brown, shining, partly concealed by rather numerous small, recumbent, yellowish-cinereous scales, most of them rather wide, but those on inner margin of each sutural interspace narrow and hairlike; each interspace with a median row of longer, erect, concolorous scales, or short, wide setae, becoming slightly longer behind. Declivity evenly arched, not sulcate, with interspaces slightly narrowed.

Ventral surface reddish brown, shining, clothed with yellowish-cinereous, recumbent scales, usually bifurcate; last abdominal segment with erect, yellowish-cinereous setae. Foretibia (fig. 18, *l*) with seven stout teeth on outer margin.

Male.—Similar in size and general habitus to female, but with the frons strongly concave for entire width, with much longer setae at sides and above; antennal club larger, about 1.8 times as long as wide; pronotum with setae on anterior margin longer, and with asperities greatly reduced or even lacking; teeth on foretibia usually nine in number (fig. 18, *m*).

Type locality.—Ceara, Brazil.

Host.—Unknown.

Type material.—Holotype, allotype, and 19 paratypes, U.S.N.M. No. 52956.

Received from D. da Rocha, Ceara, Brazil.

RENOCIS INSULARIS, new species

FIGURES 17, *p*; 18, *n*

Female.—Light reddish brown, with cinereous and fulvous scales; 1.46 mm. long, 1.82 times as long as wide.

Frons with epistomal margin scarcely toothed in median line fringed with fine yellow-cinereous setae, covering basal halves of mandibles; very feebly transversely impressed above epistoma, frons convex, only slightly flattened on disk; surface subopaque, reddish brown, finely granulate-punctate; surface partly concealed by rather short, stout, recumbent, cinereous setae directed dorso-mesad. Eye 3 times as long as wide, finely granulate; the inner line broadly, shallowly emarginate. Antenna (fig. 17, *p*) with club broad-oval, 1.33 times as long as wide; with three annulate-setigerous sutures, first nearly straight, second and third rather weakly procurved.

Pronotum 1.61 times as wide as long, widest near base, which is very broadly, shallowly emarginate in median half; sides behind strongly arcuate, constricted anteriorly; scarcely at all impressed behind the broadly rounded front margin, which is very feebly sinuate in median area, and bearing a sparse fringe of erect, spatulate, fulvous setae, only slightly shorter in median area; surface reddish brown, feebly shining, finely punctate, reticulate-granulate; at each side with two transverse rows of small, sharp asperities (4-6 each row), each bordered posteriorly by a single row of erect, yellow-cinereous scales; surface partly concealed by numerous small, recumbent scales, fulvous on anterior disk and nearly white on sides and on a narrow band behind; with a few erect setae in median line near base.

Elytra 1.26 times as long as wide, scarcely wider than pronotum; sides straight and subparallel on anterior two-thirds, moderately broadly rounded behind; basal margins moderately strongly elevated from suture to fifth interspace on each elytron, with eight crenulations on each in a continuous line; striae impressed, less than half as wide as interspaces, punctures close, of moderate size; interspaces appearing nearly flat, finely rugose-punctate, with a few weak granules, median row of punctures slightly larger; surface reddish brown, shining, partly concealed by numerous scales, recumbent anteriorly on disk, suberect behind, with a median row of erect scales or short setae in each interspace; scales cinereous and fulvous intermixed, with a single row of nearly white cinereous scales next to suture in each sutural interspace. Declivity evenly arched, not sulcate, striae equally impressed, interspaces slightly narrowed and scales erect or suberect.

Ventral surface reddish brown, feebly shining, thinly clothed with nearly white, recumbent, usually bifurcate scales, with some of scales

replaced by erect, coarse setae on last three abdominal segments. Fore tibia (fig. 18, *n*) with outer margin armed with four short, very stout, blunt teeth.

Male.—Similar in size and habitus, but with the frons distinctly concave from eye to eye, with longer and more abundant setae at sides and above; pronotum with asperities nearly lacking.

Type locality.—Key West, Fla.

Additional locality.—Cayamas, Cuba.

Host.—Unknown.

Type material.—Type, allotype, and 2 paratypes, U.S.N.M. No. 52957.

Remarks.—Holotype, allotype, and 1 female paratype from Key West, Fla., collection of Hubbard and Schwarz; 1 female paratype. Cayamas, Cuba, E. A. Schwarz, collector.